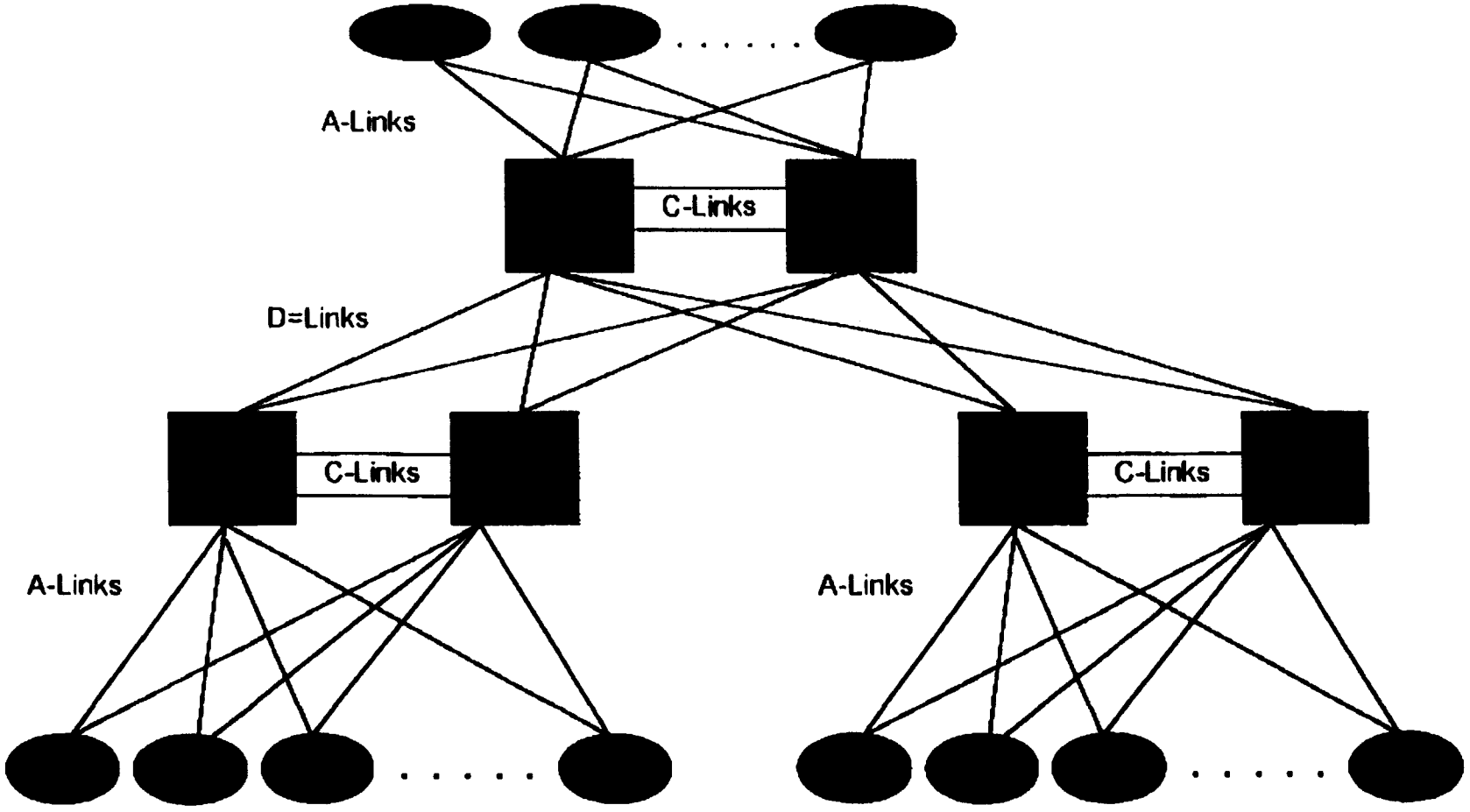
ATTACHMENT 3

SCPM
Two Level CCS/SS7 Architecture



Signaling Cost Proxy Model - SCPM

Purpose

The Signaling Cost Proxy Model (SCPM) is a stand-alone module of the enhanced Benchmark Cost Proxy Model (BCPM) designed to develop the per line investment required to create the signaling portion of the telecommunications network. SCPM supports both the Universal Service investment as well as Unbundled Network Element (UNE) investments. In addition, SCPM calculates transport expense per line based on user defined transport rates. SCPM shall be integrated into the BCPM upon completion and testing of the stand-alone version.

Although SCPM is designed to accommodate both USF and UNE investments, the SCPM v1.0 beta release supports USF investment calculations only, with the intent of addressing the Further Notice of Proposed Rulemaking, released by the FCC on July 18, 1997. Much of the logic and input tables required for UNE investments are included in SCPM v1.0 beta, but the final investment calculations are not yet available. In addition, the regional Signal Transfer Point (STP) and Service Control Point (SCP) database investments required for UNE are not included in SCPM v1.0 beta release.

Signaling Overview

The Common Channel Signaling (CCS) network is a packet switched communications network that allows call control messages to be transported on a dedicated high speed data network separate from the voice or data communications path. The CCS network uses the Signaling System 7 (SS7) message protocol.

The CCS/SS7 network replaces circuit associated signaling used on interoffice message trunks, substantially increasing trunk efficiency. In addition, the CCS/SS7 network enables many new features, including Call Rejection, Last Call Return, Calling Name Delivery, and Credit Card Verification.

The basic components of the CCS network include signaling links, Service Switching Points (SSP), STPs and SCPs. These components are described below.

Service Switching Point

Service Switching Points (SSP) are central office switches that contain hardware and software, allowing them to terminate CCS signaling links and send, process, and receive signaling messages. End office wire centers, host offices, and tandem offices are the most common SSPs.

Signal Transfer Point

STPs are highly reliable packet switches that provide efficient message transfer among CCS nodes. STPs are configured in a two level hierarchy, with local STPs and regional STPs. (See the attached depiction of a Two Level SS7 Signaling Architecture.) Typically, only the regional STPs are connected to the SCPs. This architecture relieves the regional STPs and D links of heavy message loads associated with most local call setup services. STPs are the "traffic cops" of the CCS network, providing translation and routing functions for signaling messages from various network signaling entities. In addition, the STPs provide gateway screening and interconnection capabilities for other networks. STPs are geographically separated in a mated pair configuration for redundancy and reliability.

Service Control Point

Service Control Points (SCP) are network nodes that provide a variety of centralized, on-line database services. The SCP stores customer data and service logic and responds to queries from SSPs. For example; "One Call Pizza" has its listings of metropolitan locations stored in the SCP. When a caller dials the "One Call Pizza" 800 number, the originating SSP (equipped wire center) sends a query to the SCP via

its local and regional STP for the nearest location for One Call Pizza. The SCP responds with the routing information for nearest location. The customer's call is set up to the closest Pizza outlet.

SCPs are deployed in a geographically separate mated pair arrangement for reliability. Two databases typically found in the SCPs are the Call Management Service Database (CMSDB) and Line Information Database (LIDB). CMSDB provides routing instructions for 800 and 888 calls. LIDB validates calling card numbers, among many other features.

Signaling Links

Signaling links are the digital transmission paths that transfer signaling messages between nodes of the CCS network. They are synchronous bi-directional transmission facilities operating at 56 kbps. For reliability, diverse routing is important so that a single failure does not isolate a network node. The link types include:

A Links	Access links connect SSPs and STPs or STPs and SCPs.
B Links	Bridge links connect mated STP pairs to other mated STP pairs on the same hierarchical level.
C Links	Cross links connect mated STP pairs. STPs are deployed in pair for network reliability. These STP pairs are referred to as "mated" pairs.
D Links	Diagonal links connect STPs on different hierarchical levels (local STP to regional STP).
E Links	Extended links connect SSPs to STPs other than their associated home STP.
F Links	Fully associated links connect SSP to SSP with no intermediate STP.

SCPM Methodology

SCPM creates the signaling network using the current STP deployment in the U.S., both number of STPs and location, as the baseline. No local or regional STPs are omitted or "relocated". SCPM assumes that, forward-looking, all host, end office, and tandem switches are SSP-equipped and contain the software necessary to query any SCP within the signaling provider's network. Investments created by SCPM include all links, the local and regional STP pairs, as well as the SCPs. Additional costs related to 3rd party databases and hub provider costs incurred by the signaling provider are also reflected. *Investments related to signaling hardware and software within each switch are not included in SCPM.* These investments are reflected in the BCPM switching module. Note that signaling costs related to local number portability are not included in SCPM v1.0. In addition, signaling Operations Systems Support costs are not included in SCPM v1.0 beta, the stand alone version that serves as the basis for testing.

There are two general categories of SS7 signaling messages: ISDN-UP and TCAP. ISDN-UP messages are primarily related to trunk setup and tear down between switches, while TCAP messages are related to database and non-database queries. For purposes of Universal Service investments, only TR-317 ISDN-UP messages are considered by SCPM v1.0 beta. TR-317 defines an interswitch, intraLATA call. In addition, only costs related to A-Links connecting SSPs to Local STPs (LSTP) as well as the LSTP pair itself are included in the Universal Service investment developed by SCPM v1.0.

Inputs

SCPM utilizes three sources of data, the Local Exchange Routing Guide (LERG), other BCPM modules , and user-defined inputs.

LERG Data

Data required from the LERG include operating company number, office name, office CLLI, and office v & h coordinates. In addition, each office's corresponding LSTP pair CLLI and v & h coordinates are required.

Other BCPM Modules

Residential and business access lines are obtained from the BCPM loop module.

User-Defined Inputs

SCPM is designed to provide the user with maximum input flexibility wherever possible. SCPM supports up to five different STP models, each with different processor capabilities and pricing. STP models can represent different manufacturers' STPs, different size STPs from the same manufacturer, or a combination.

In addition, SCPM allows the user to define six different C.O. switch profiles, characterizing the monthly signaling activity of a residential and business line for each switch profile. Switch profiles can be used to represent large, small, metro, rural, and tandem switches, for example. Lastly, the user may define up to 10 custom signaling messages/events by supplying the octet, millisecond, and query requirements of the message/event. Currently, the user must also supply the CLLI and v & h coordinates of the Regional STPs linked to the LSTPs in the input data.

Basic SCPM Model Flow

SCPM develops investments for business and residential lines by office CLLI as follows:

1. Import data file.
2. Assign an LSTP and RSTP pair to all offices that are not currently SS7 capable.
3. Based on user defined switch profiles and STP performance metrics, calculate the total octet and processor millisecond demand by LSTP and RSTP pair.
4. Calculate per octet and per millisecond annual investment for each LSTP and RSTP pair based on user defined STP investments. SCPM annual investment = investment/annual demand.
5. Calculate A-link monthly transport expense per line based on user defined transport rates.
6. Calculate residential and business line signaling investment, excluding the SSP investment captured in the BCPM switch module, by CLLI using per octet and per millisecond investments combined with switch profiles.

See the attached detail model flow diagram.

SCPM Worksheets

The worksheets contained within SCPM v1.0 beta are listed below with a brief description of their function. Note that the order, name, and number of worksheets within SCPM are subject to change before final release. The final version of SCPM v1.0 will display only the menu sheet, user input sheets, and output sheets. For clarity, all other worksheets will be hidden with a menu option to show hidden worksheets.

Worksheet Name	Category	General Function
Main Menu	Buttons	Contains the macro button(s) used to run SCPM.
Testing Main	Buttons	Used for program testing - contains macro buttons for intermediate steps within SCPM.
Demand Inputs	User Inputs	Table for user-definable switch types.
Engr Inputs 1	User Inputs	Table for SS7 message specifications and manufacturer-specific processor matrics.
Engr Inputs 2	User Inputs	Table for additional manufacturer-specific STP performance data.
Investment Inputs	User Inputs	Tables for STP investments by processor, port, and manufacturer.
Costing Inputs	User Inputs	Tables for costing-specific inputs.
Work Area	Calculations	Contains SCPM calculation data and CLLI level outputs.
LSTP Demand	Calculations	Accumulates demand data by LSTP pair.
Demand Calcs1	Calculations	Calculated tables which combine switch profiles with message demand characteristics.
STP Type	Calculations	Table that allows user to identify manufacturer of a specific STP pair. Not fully implemented
Default LSTP List	Calculations	Table that provides a default LSTP/RSTP pair for non-SS7 offices.
LSTP List	Calculations	Calculated table that lists each unique LSTP pair in the user's input.
Input	User Inputs	Copy of the original user input file selected.
Code - Assign STPs	VBA code	Assigns LSTP and RSTP pairs to non-SS7 offices.
Code - Data Import	VBA code	Reads in a user-specified file.
Code - Formula Fills	VBA code	Populates all formula cells based on input file size.
Code - LSTP Demand	VBA code	Creates the LSTP Demand table
Code - Clear Data	VBA code	Contains subroutines to clear previous data from all input and calculation sheets.
Code - Misc	VBA code	Miscellaneous housekeeping functions.
Code - SCPM Main	VBA code	The "main program" that calls all other programs.

PROGRAM FLOW

(*) = not coded for beta release.

Import Data File

The initial standalone version of SCPM will import a user-specified Excel file. When SCPM is integrated into BCPM, most data will be pulled from the common BCPM data repository.

Clear data from previous SCPM run.

- Clean "Input" worksheet
- Clear "Work Area" worksheet
- Clear "Work Area" formulas
- Clear "LSTP List" worksheet
- Clear "LSTP Demand" worksheet
- Clear "LSTP Demand" formulas

Prompt user for input file

The input file must contain the following data, starting in column 1, row 2 of the input worksheet:

Data	Source (non-integrated SCPM)
Operating Company Number	LERG
Office Name	LERG
Office CLLI	LERG
Office LATA	LERG
Office "v" coordinate	LERG
Office "h" coordinate	LERG
LSTP1 CLLI (first of pair)	LERG
LSTP1 LATA	LERG
LSTP1 "v" coordinate	LERG
LSTP1 "h" coordinate	LERG
LSTP2 CLLI (second of pair)	LERG
LSTP2 LATA	LERG
LSTP2 "v" coordinate	LERG
LSTP2 "h" coordinate	LERG
RSTP1 CLLI (first of pair)	User-specified (currently)
RSTP1 LATA	User-specified (currently)
RSTP1 "v" coordinate	User-specified (currently)
RSTP1 "h" coordinate	User-specified (currently)
RSTP2 CLLI (second of pair)	User-specified (currently)
RSTP2 LATA	User-specified (currently)
RSTP2 "v" coordinate	User-specified (currently)
RSTP2 "h" coordinate	User-specified (currently)
Res Lines	BCPM loop
Biz Lines	BCPM loop
Remote Indicator	LERG
Host CLLI	LERG

For an individual state analysis, the input file must contain all offices within the state as well as all offices that are supported by the STP pairs within the state. Note that this may result in the need to include offices outside of the state which are supported by STP's within the state. Omission of any offices will result in understated demand and overstated per line investments.

Check for input file errors (*)

Note: Data starts on the second line. The first line may contain column headers or may be blank.

Check for ANY blank cells in the following columns.

OCN, CLLI, LATA, V, H, Res & Biz lines (may be zero?)

Verify that 11 digit CLLIs are used

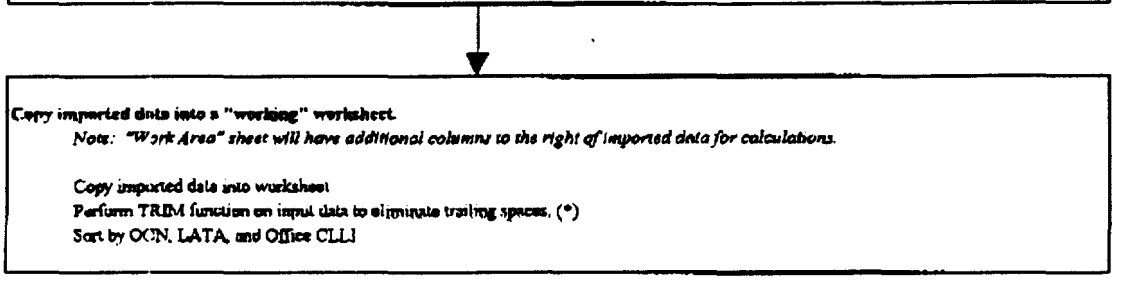
Conditional checks

LSTP checks

If LSTP1 is not blank, is position 11 in the CLLI "W"

If LSTP2 is not blank, is position 11 in the CLLI "W"
If LSTP1 is not blank, is there a LATA, V, and H specified
If LSTP2 is not blank, is there a LATA, V, and H specified
If LSTP1 is not blank, is LSTP2 not blank
If LSTP2 is not blank, is LSTP1 not blank
If LSTP1 is not blank, are both RSTP1 and RSTP2 not blank. (prior checks will cover LSTP2)

RSTP checks
If RSTP1 is not blank, is position 11 in the CLLI "W"
If RSTP2 is not blank, is position 11 in the CLLI "W"
If RSTP1 is not blank, is there a LATA, V, and H specified
If RSTP2 is not blank, is there a LATA, V, and H specified
If RSTP1 is not blank, is LSTP2 not blank
If RSTP2 is not blank, is LSTP1 not blank



Copy imported data into a "working" worksheet.
Note: "Work Area" sheet will have additional columns to the right of imported data for calculations.

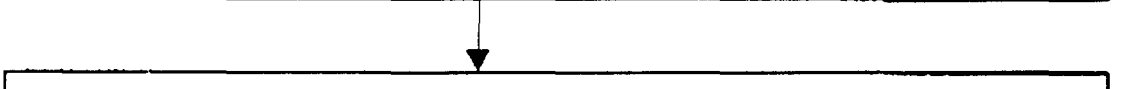
Copy imported data into worksheet
Perform TRIM function on input data to eliminate trailing spaces, (*)
Sort by OCN, LATA, and Office CLLI

Assign all offices a Local and Regional STP pair for the office's signaling traffic.

SCPM is a forward-looking model that assumes that all host and end-offices are SS7-capable. In SCPM, SS7-capable is defined as the ability to generate ISDN-UP and TCAP signaling messages and the ability to query any SCP in the provider's network. The following set of instructions maps a local and regional STP pair to every office supplied in the input file.

Build LSTP/RSTP list
This instruction set will construct a list of OCNs and their corresponding STP pairs by LATA. Not all OCNs will be represented in the resulting table since not all OCNs are SS7-capable.

Sort Work Area data by OCN
For each OCN in the Work Area, identify the LSTP pair used by its offices for each LATA and copy the data to the "LSTP List" worksheet.



Assign LSTP and RSTP pairs to CLLIs that are not currently SS7-capable (i.e. they are not SSPs)
Sort Work Area by LSTP1 CLLI (descending), OCN, Office LATA
CLLIs without a populated LSTP1 field will fall to the bottom.
For each Office CLLI without an LSTP/RSTP assignment
Using the "LSTP List" worksheet, check to see if that office's OCN has an LSTP in the same LATA
If YES, then assign that LSTP/RSTP data to the office.
If NO, then
Check to see if that office's OCN has an LSTP in the same state
If YES, then assign that LSTP/RSTP data to the office.
If NO, then
Assign the default LSTP/RSTP pair that LATA from the "Default LSTP List" worksheet

Note: the Default LSTP List currently includes the LSTP/RSTP pair for the predominant LEC in the state. Therefore, all offices in given state are mapped to the predominant LEC's SS7 network if the OCN in question has not SS7 capability in the state. (SCPM v1.0 beta includes LEC defaults for the Colorado test file only)

	user specified switch type and LSTP type, and total business lines.
Total Annual Octets	Totals residential and business annual octet demand for the LSTP pair. Used to calculate links requirements
Total Annual GTT	Totals residential and business annual GTT millisecond demand for the LSTP pair. Used to calculate overall millisecond demand, along with GTT and Gateway Screening milliseconds.
Total Annual Queries	Totals residential and business annual query demand for the LSTP pair. Will be used in LNP and UNE calculations.
Total Annual Dips	Totals residential and business annual database dip demand for the LSTP pair. Will be used in LNP and UNE calculations.
Total Annual Gateway Scrn	Totals residential and business annual Gateway Screening millisecond demand for the LSTP pair. Used to calculate overall millisecond demand, along with GTT and Gateway Screening milliseconds.
Total Annual Millisec	Totals residential and business annual MTP millisecond demand for the LSTP pair. Used to calculate overall millisecond demand, along with GTT and Gateway Screening milliseconds.

USF Annual Res Octets	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Res GTT	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Res Queries	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Res Dips	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Res Gateway Scrn	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Res Millisec	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Biz Octets	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Biz GTT	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Biz Queries	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Biz Dips	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Biz Gateway Scrn	Same as above set of totals, except that only USF-defined signaling events are totaled.
USF Annual Biz Millisec	Same as above set of totals, except that only USF-defined signaling events are totaled.
Total USF Annual Octets	Same as above set of totals, except that only USF-defined signaling events are totaled. Used to calculate percent of LSTP demand that qualifies for High Cost funding
Total USF Annual GTT	Same as above set of totals, except that only USF-defined signaling events are totaled. Used to calculate percent of LSTP demand that qualifies for High Cost funding
Total USF Annual Queries	Same as above set of totals, except that only USF-defined signaling events are totaled. Used to calculate percent of LSTP demand that qualifies for High Cost funding
Total USF Annual Dips	Same as above set of totals, except that only USF-defined signaling events are totaled. Used to calculate percent of LSTP demand that qualifies for High Cost funding
Total USF Annual Gateway Scrn	Same as above set of totals, except that only USF-defined signaling events are totaled. Used to calculate percent of LSTP demand that qualifies for High Cost funding
Total USF Annual Millisec	Same as above set of totals, except that only USF-defined signaling events are totaled. Used to calculate percent of LSTP demand that qualifies for High Cost funding
LSTP State	Derived from LSTP1 CLLI code. Used to determine if links are interstate.
SSP A-Link1 Distance	The airmile distance from the SSP to the first LSTP of the mated pair. Used to calculate monthly link transport expense.
SSP A-Link1 T-Port Class	1 = IntraLATA link, 2 = Intrastate, InterLATA link, 3 = Interstate, InterLATA link, for the first link of the link pair
SSP A-Link2 Distance	The airmile distance from the SSP to the second LSTP of the mated pair. Used to

	calculate monthly link transport expense.
SSP A-Link2 T-Port Class	1 = IntraLATA link, 2 = Intrastate, InterLATA link, 3 = Interstate, InterLATA link, for the first link of the link pair.
LSTP A-Link Port Pair Count	Calculates the number of A-Link port pairs required to connect each SSP to its LSTP pair.
Inv Per Octet - LSTP	Shows the appropriate per octet annual investment for the office's LSTP pair. Refers to the LSTP demand worksheet, where the investment calculations are performed.
Inv Per Millisec - LSTP	Shows the appropriate per millisecond annual investment for the office's LSTP pair. Refers to the LSTP demand worksheet, where the investment calculations are performed.
Inv Per Res Line - LSTP	Multiplies the octet investment by the number of octets per line as defined by the office's switch profile to produce the annual investment per residential line. This will be expanded in the final release to show investment by account code.
Inv Per Bus Line - LSTP	Same as above for business lines.

CERTIFICATE OF SERVICE

I, Rebecca Ward, do hereby certify that on this 8th day of August, 1997, I have caused a copy of the foregoing **JOINT COMMENTS OF BELLSOUTH CORPORATION, BELLSOUTH TELECOMMUNICATIONS, INC., U S WEST, INC., SPRINT LOCAL TELEPHONE COMPANIES TO FURTHER NOTICE OF PROPOSED RULEMAKING SECTION III.C.3.a-d, III.c.4** to be served via first-class United States Mail, postage prepaid, upon the persons listed on the attached service list.

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***Via Hand-Delivery**

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